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ABSTRACT

A sample of 21 guidance counselors was administered the full battery of Johnson O'Connor Research Foundation aptitude tests to compare scores with the "general population" (norm group). The counselors had worked in public schools, private schools or as self-employed consultants for an average of 10 years. The average age was 42. The tests, which were developed over a sixty-year period, measure a wide range of aptitude areas including perceptual speed, spatial ability, reasoning, dexterity, memory, music and divergent thinking. The guidance counselor sample scored significantly higher than the general population in Ideaphoria (a measure of verbal fluency), Inductive Reasoning (quickness in seeing relationships), and Pitch Discrimination. They also tended to score high in Foresight and Tonal Memory, but the differences from general-population scores were not statistically significant. The high Ideaphoria and Inductive Reasoning scores were expected because the counselor's job appears to use these aptitudes; the high scores on the music tests, however, do not have a ready explanation. (Author/CM)

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APTITUDE SCORES OF GUIDANCE COUNSELORS

by

Bruce Foxley, Joan Brodie and Mark Daniel

JOHNSON O'CONNOR RESEARCH FOUNDATION
HUMAN ENGINEERING LABORATORY

Technical Report 1982-1

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Aptitude Scores of Guidance Counselors

Bruce Foxley, Joan Brodie, and Mark Daniel

Summary: A sample of 21 guidance counselors was administered the full battery of Johnson O'Connor Research Foundation aptitude tests. They score statistically significantly higher than the general population in Ideaphoria (a measure of verbal fluency), Inductive Reasoning (quickness in seeing relationships), and Pitch Discrimination. They also tend to score high in Foresight and Tonal Memory, but the differences from general-population scores are not statistically significant. The high Ideaphoria and Inductive Reasoning scores were expected, because the counselor's job appears to use these aptitudes; the high scores on the music tests, however, do not have a ready explanation.

Over the past three years guidance counselors have been tested in various offices of the Johnson O'Connor Research Foundation as part of a testing program funded by a private grant. More recently, efforts to increase the public's awareness of the Foundation have resulted in a number of counselors being tested. The test scores of 21 of these guidance counselors were collected from Atlanta (3 cases), Detroit (11), Fort Worth (1), New Orleans (1), and Philadelphia (5). Although more potential subjects for this study were submitted, only those counselors who had been working in their field for at least the last four years and had indicated that they like their work were included.

Sample and Procedures

Of the 21 counselors, 8 are male and 13 female, with an average age of 42 years (range 30-53). They have worked in public schools, private schools, or as self-employed consultants for an average of 10 years (range 4-25). Sixteen hold an M.A., M.S., or M.Ed. in counseling; of the others, one has a Ph.D. in psychology, three have Master's degrees in other fields, and one has a Bachelor's degree.

All of the participants in this study took the standard battery of aptitude tests offered by the Johnson O'Connor Research Foundation. A list of the aptitudes measured is given in Table 1. The tests, which have been developed over a period of sixty years by the Foundation, cover a wide range of aptitude areas including perceptual speed, spatial ability, reasoning, dexterity, memory, music, and divergent thinking. The median reliability of the tests is .87, and they have been involved in numerous validation studies.

Most of the tests are scored on percentile norms, although for several of the tests only quartile breakdowns are available. The norm population consists of people who have taken the Foundation's aptitude tests in the past, a group which has more years of schooling than the national population (adults average 15.8 years completed; Bowker & Moore, 1981). There are separate norms for different age groups, and on tests having a sex difference, separate norms for males and females. Therefore, percentile scores for examinees of different age and sex are comparable with one another, and can reasonably be combined into a single score distribution.

Table 1
Aptitudes Measured

Name	Description
Graphoria	Number-checking or clerical speed; speed of comparing pairs of numbers to see whether they are the same or different.
Ideaphoria	Verbal fluency, rate of flow of ideas.
Foresight	Keeping one's mind on a distant goal, taking a far-sighted viewpoint.
Inductive Reasoning	Quickness in seeing a relationship among separate facts, ideas or observations.
Analytical Reasoning	Arranging ideas into a logical sequence.
Structural Visualization	Visualizing an object in three dimensions, imagining how a solid object will look when taken apart or viewed from a different angle. This aptitude is measured by two tests: Wiggly Block, a timed assembly test, and Paper Folding.
Tonal Memory	Remembering a sequence of tones.
Pitch Discrimination	Distinguishing between tones very close to each other in pitch.
Rhythm Memory	Remembering a complex rhythm pattern.
Personality	When dealing with people, tending to react from a general, objective viewpoint vs. reacting from a personal, subjective viewpoint.
Memory for Design	Memory for straight-line patterns.
Observation	Memory for fine visual details.
Number Memory	Remembering several six-digit numbers simultaneously.
Silograms	Remembering paired nonsense and English words.
Finger Dexterity	Speed and accuracy in manipulating small objects with the fingertips.
Tweezer Dexterity	Speed and accuracy in handling small objects with tweezers.
Grip	Strength of grip, using a hand dynamometer.
English Vocabulary	Knowledge of general English vocabulary.

The basic approach of this study is to see whether the counselors tend to score higher or lower than the "general population" (the norm group) on any of the aptitude measures. If there is no difference between counselors and the general population on an aptitude, the expected median score for the counselors will be the 50th percentile. Differences between the counselors' score distribution and the general population distribution are tested for statistical significance using the Mann-Whitney *U* test, in which the general population is represented by a hypothetical distribution of 1,000 cases spread evenly across the percentile range. An exception was made on Pitch Discrimination where the counselors' mean raw score was compared with the general population mean. For the Personality test, the certile norms for ages 22+ were used (Daniel, 1979).

Comparing the counselors' scores with those of the general population is an example of "taxonomic" validation. If the counselors tend to score higher than the general population on a test, one can infer that people who are relatively high in that aptitude are better suited to the job than people who score low: either they are more likely to be attracted to the field, or they have a better chance of being successful and satisfied in the field once they have entered it. A high score distribution suggests that the aptitude is in some way relevant to the performance of the job of the counselors. Conversely, if the counselors were to score lower than the general population on a test, we would look for ways in which that aptitude might interfere with or hinder job performance.

Results

The median percentiles and results of significance tests are presented in Table 2. Frequency distributions are shown in Figure 1, and the raw data are listed in the Appendix. Figure 1 is in "stem and leaf" format. The first digit of the percentile score is shown to the left of the vertical line; the asterisk indicates that the second digit is shown to the right of the vertical line. Thus, on Graphoria there were three cases with scores of 95. Only the M form of Number Memory could be used because the earlier forms do not take into account the decline with age. Finger Dexterity was not analyzed because of the recent change in form (from two hands to one hand), and the lack of separate-sex norms.

As a group the guidance counselors score significantly high, as expected, in Ideaphoria and Inductive Reasoning. Ideaphoria is thought to be useful because of the counselors' need to express themselves easily and fluently. The combination of Ideaphoria and Inductive Reasoning is thought to be helpful in fields where one must diagnose a problem (by seeing the implications of a set of facts) and come up with a number of possible solutions or approaches. The counselors also score significantly high in Pitch Discrimination, a finding which was not expected and is difficult to interpret.

There seems to be a place in counseling for both the Objective and the Subjective personality. Foresight scores are above average but not

Table 2
Medians and Statistical Significance Tests

Test	Median Percentile	*N*	*U*	*p*
Graphoria	55	20	8850	.38
Ideaphoria	80	21	6025	.001
Foresight	68	21	8575	.15
Inductive Reasoning	75	21	6500	.003
Analytical Reasoning	50	21	10450	.97
Wiggly Block	50	21	10025	.72
Paper Folding	55	12	5950	.96
Personality	63[a]	21	9800	.60
Tonal Memory	75	21	8025	.07
Pitch Discrimination	B	21	(t=3.03)[b]	.003
Rhythm Memory	64	21	9600	.50
Memory for Design	45	21	9725	.56
Silograms	56	14	6700	.78
Number Memory (Form M)	69	12	5300	.48
Observation	45	21	9925	.67
Tweezer Dexterity	55	21	10425	.95
Grip	C	21	9125	.30
English Vocabulary	60	21	9325	.38

[a] 75th certile Objective.
[b] Comparison of raw scores. The 21 counselors have a mean raw score of 68.95 (SD = 6.25). A recently tested group of 1,602 examinees (Trafton, 1981) has a mean of 61.93 (SD = 10.59).

Figure 1
Percentile Distributions

Graphoria		Ideaphoria		Foresight		Ind. Reas.		Ana. Reas.	
10*	0	10*	000000	10*		10*	0	10*	
9	555	9	005	9	0255555	9	5555	9	5555
8*	5	8*	005	8*		8*	359	8*	
7	05	7	05	7	236	7	355555	7	25
6*	05	6*	55	6*	78	6*	55	6*	55
5	555	5	5	5	04	5	58	5	555
4*	0555	4*		4*	5	4*		4*	25555
3	05	3	55	3	35	3	55	3	
2*		2*	0	2*	8	2*		2*	5
1	00	1	0	1	008	1		1	35
0*		0*		0*		0*	7	0	55

Wiggly Block		Paper Folding		Personality[a]		Tonal Memory		Rhythm Memory	
10*	0	10*	0	10*		10*	0	10*	
9	00	9	0	9	1	9	05688	9	33799
8*	0	8*	5	8*	1558	8*	0005	8*	188
7	05	7	5	7	3366	7	55	7	
6*	00	6*	00	6*	33	6*	0	6*	44
5	000055	5	0	5	8	5	0	5	055
4*	000	4*	5	4*	22	4*	00	4*	000
3	00	3	0	3	004	3	55	3	
2*	5	2*	5	2*	13	2*		2*	
1	0	1	0	1	88	1	333	1	058
0		0	5	0*		0*		0*	55

Silo-grams[b]		Number Memory[c]		Observation		Tweezer Dexterity		English Vocabulary	
10*		10*		10*		10*		10*	
9		9		9	5	9	00055	9	005
8*	00088	8*	88888	8*		8*		8*	005
7		7	5	7	5	7	55	7	55
6*	33	6*	03	6*	5555	6*	00	6*	0055
5	0	5		5	5555	5	055	5	0005
4*	0	4*		4*	5555	4*	00	4*	
3	088	3	0	3	55555	3	5	3	5
2*		2*		2*	5	2*	005	2*	5
1	36	1	033	1	5	1	055	1	55
0*		0*		0*		0*		0*	5

[a] Percentile scores, not certiles.
[b] Form AF only.
[c] Form M only.

Figure 2
Grade Distributions

	Pitch Discrimination		Grip
A	XXXXXX	A	XXXX
B	XXXXXXXXXX	B	XXXXXX
C	XXXX	C	XX
D		D	XXXXXXXXX

Note: "A" is the top quartile (76th through 100th percentiles), "B" the second quartile, "C" the third and "D" the bottom quartile.

significantly so; the substantial inter-administrator variation on this test obscures the results.

In addition to the high Pitch Discrimination average, the counselors tended to score high on Tonal Memory, although the difference here is not quite significant ($p = .07$). The Foundation has found a tendency toward high scores on the music tests in several other occupational groups where it would not have been expected, including physicians (Daniel, 1978) and people in the computer field (Plancon and Daniel, 1978). The norms for these tests are reasonably current and based on large samples, so it is unlikely that they are inaccurate. It is hard to imagine an explanation for these results that would encompass such different occupations.

There is an unusual clustering of scores on the Object Observation test, where 18 of the 21 counselors score in the middle half of the percentile distribution. The deviation from the expected distribution shape is statistically significant ($\chi^2(3) = 10.81$, $p < .02$). However, because this result was not anticipated before the data were collected, and because there is no ready explanation for it, it is prudent to consider this to be a chance finding until it is replicated in another sample.

For the Wiggly Block, the medians for males and females were calculated separately to see whether there is any difference. Both medians are at or near the general-population median: the male median is 57.5, and the female median is 50. (It bears repeating that each sex is scored on norms for its own sex; in raw-score terms, females score quite a bit lower than males.) Thus, there is no evidence to suggest a sex difference in the relevance of Structural Visualization to counseling work. Because counselors deal with people and abstract ideas, rather than with spatial problems, they might have been expected to score lower than the general population. On the other hand, the results are in line with the finding by Bowker (1981) that psychology majors score relatively high in Structural Visualization.

On the other aptitude and vocabulary tests there are no differences between the counselors' scores and those of the general population.

Proposals for Further Research

It is planned to expand this study using additional counselors tested under the grant or for public information. We would particularly like to see what happens to the score distributions on the music tests and Observation when more cases are added. The data will also be examined to see if there is a sex difference in the counselor's profile.

Several cases have already been collected of counselors who have expressed dissatisfaction with their field. Eventually, if a sufficient number of such cases can be collected, it would be enlightening to compare their scores with those of the satisfied counselors.

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Appendix
Raw Score Data

	Folder No.	Sex	Age	Yrs. Exp.	Degree	Graphoria 613 CJ RS	Graphoria 613 CJ %ile	Ideaphoria 161 F	Ideaphoria 161 RS	Ideaphoria 161 %ile
1	1138-11	M	35	5	MS/Coun.			CJ	430	100
2	4567-11	M	37	13	MA/Guid.	163	55	AJ	204	20
3	10664-11	F	52	12	MA/Guid.	152	45	CJ	390	100
4	10667-11	M	42	9	MA/Guid.	157	45	CJ	445	100
5	10670-11	M	42	11	MA/Coun.	159	45	AJ	412	100
6	4-108871-11	M	45	14	MA/Guid.	188	85	CJ	240	35
7	4-108873-11	F	53	11	MA/Guid.	144	30	AJ	193	10
8	4-108874-11	F	33	4	MA/Guid.	182	75	AJ	350	85
9	4-108876-11	M	41	16	MED/Guid.	152	35	AJ	235	35
10	4-108877-11	F	41	8	MA/Guid.	170	55	CJ	333	80
11	4-108880-11	F	35	10	MA/Guid.	201	95	AJ	312	65
12	4242-15	F	50	9	MED/Guid.	126	10	CJ	310	65
13	4244-15	F	43	5	MAT/Biol.	177	70	CJ	404	100
14	11033-15	F	45	4	MED/Coun.	166	55	AJ	393	100
15	13015- 8	F	30	4	MS/Guid.	128	10	AJ	374	90
16	11660-17	M	48	25	MS/Guid.	152	40	CL	306	80
17	8735- 4	F	51	12	BS/PreMed	202	95	AJ	350	90
18	11959- 4	F	38	8	PhD/Psych.	177	65	CJ	392	95
19	11983- 4	F	43	6	MS/Guid.	204	95	AJ	290	55
20	13501- 4	M	38	8	MS/French	209	100	AL	297	75
21	13525- 4	F	48	12	MA/Ed.	165	60	AL	306	70

	Foresight 307 AI RS		Inductive Reasoning 164 F	Inductive Reasoning 164 RS		Analytical Reasoning 244 F	Analytical Reasoning 244 RS		Wiggly 4,5,6 AE RS		Paper Folding 622 FA[a] RS	
1	79	76	LA	182	95	CO	35	42	224	55		
2	39	10	LA	140	35	CQ		D	190	40	2	10
3	46	18	LA	119	35	CQ	30	55	135	50	22	90
4	56	35	LA	134	85	CQ	30	55	166	30	15	50
5	126	95	LA	152	65	CQ	32	45	219	55	21	60
6	41	10	FI+EI	100	7	CO	19	5	258	75		
7	52	28	FI+EI	140	58	CO	32	45	114	40		
8	54	33	FI+EG	162	89	CO	23	5	130	30		
9	65	72	FI+EI	153	83	CO	41	75	109	90		
10	67	54	FI+EI	147	73	CO	29	25	134	40		
11	65	50	FI+EI	189	100	CO	43	72	168	100		
12	110	95+	LA	166	95	CQ	30	45	182	70		
13	109	95+	LA	156	75	CQ	41	95	151	50		
14	73	67	LA	153	75	CQ	24	15	69	10	0	5
15	72	68	LA	149	55	CQ	44	95	191	60	18	60
16	62	45	LA	172	95	CQ	41	95	271	80	32	85
17	106	95+	LA	162	95	CQ	32	55	224	90	34	100
18	77	73	LA	166	75	CQ	38	65	158	50	7	30
19	121	95+	LA	157	75	CQ	36	65	105	25	3	25
20	97	92	LA	162	75	CQ	34	45	234	60	13	45
21	93	90	LA	141	65	CQ	43	95	147	50	15	75

[a] Scored on FB norms.

Appendix (cont.)

	Personality[a] 35			Tonal Mem. 498			Pitch. Dis. 315			Rhy. Mem. 366 BB		Mem.Des. 294 UM	
	F	RS	Certile	F	RS	%ile	F	RS	Grade	RS	%ile	RS	%ile
1	AM	19	84 Obj.	BJ	67	85	FA	71	B	52	93	90	75
2	AM	18	82 Obj.	BL	33	D	FB	70	B	34	5	73	55
3	AM	16	75 Obj.	BL	65	80	FB	71	B	40	15	60	45
4	AM	18	82 Obj.	BL	61	75	FB	68	B	48	64	97	85
5	AM	16	75 Obj.	BL	27	D	FB	59	C	45	40	70	55
6	AL	6	59 Subj.	BK	64	80	FA	79	A	50	81	27	10
7	AL	9	53 Obj.	BK	49	40	FA	56	C	47	55	47	35
8	AL	12	61 Obj.	BK	77	96	FA	66	B	45	40	68	45
9	AL	20	87 Obj.	BK	78	98	FA	77	A	52	50	29	10
10	AL	21	90 Obj.	BK	65	80	FA	76	A	47	55	71	55
11	AL	19	84 Obj.	BK	69	90	FA	60	C	54	99	45	20
12	AM	22	92 Obj.	BL	48	40	FB	71	B+	48	64	46	35
13	AM	15	72 Obj.	BL	52	50	FA	74	A	45	40	59	40
14	AM	12	61 Obj.	BL	57	60	FB	65	B	53	97	58	40
15	AN	5	64 Subj.	BL	47	35	FB	66	B	38	10	52	25
16	AM	10	56 Obj.	BL	78	98	FB	67	B	51	88	83	80
17	AM	5	64 Subj.	BL	61	75	FB	69	B	51	88	115	95
18	AM	9	53 Obj.	BL	88	100	FB	79	A	54	99	78	65
19	AM	23	94 Obj.	BL	44	35	FB	63	C	41	18	55	35
20	AM	7	54 Subj.	BL	74	95	BA	75	A	52	93	55	30
21	AM	21	90 Obj.	BL	32	D	FB	66	B	31	5	90	90

	Silograms 376			Number Memory 165			Observation 206			Finger Dexterity 16			
	F	RS	%ile	F	RS	%ile	F	RS	%ile	F	Hand	RS	%ile
1	AF	43	80	BG	92	78	DC	69	75	DJ	R	100.3	95
2	AH	8	16	BM	51.5	60	DC	66	65	E	R	72.7	25
3	AH	19		BM	48	A	DC	63	55	E	R	81.7	
4	AH	28	A	BM	58	75	DC	58	45	E	R	74.3	40
5	AH	10	C	BM	0	D	DC	59	45	E	R	61.3	10
6	AF	18	40	BG	81.5	66	DC	60	55	DJ	R	78.3	50
7	AF	5	D	BG	57	38	DC	57	35	DJ	R	63.7	
8	AF	44	50	BG	86	72	DC	68	55	DJ	R	92.7	
9	AF	16	30	BG	59	42	DC	54	35	DJ	R	88.7	80
10	AF	36	B	BG	47	24	DC	58	35	DJ	R	93.3	
11	AF	57	80	BG	58.5	40	DC	70	65	DJ	R	106	
12	AF	22	C	AL	73.5	56	DC	59	45	DJ	R	91.7	
13	AF	59	A	AL	47	24	DC	56	35	DJ	R	90.3	
14	AH	8		AM	6	D	DC	54	25	EA	R	87.7	
15	AH	20		AM	25	10	EC	51	15	EA	R	74.3	
16	AH	19	B	AM	55	A	EC	55	35	EA	R	62.7	10
17	AH	28		BM	60	A	EC	82	95	EA	R	119	
18	AH	23		AM	69	A	EC	63	45	EA	L	80	
19	AH	21		BM	36.5	30	EC	67	65	EA	R	89.7	
20	AH	30	A	AM	35	B	EC	67	65	EA	R	91	85
21	AH	23		BM	77.5	A	EC	63	55	EA	R	73.3	

[a] Scored on certiles for ages 22+, Stat. Bull. 1979-4.

Appendix (cont.)

	Tweezer Dexterity 18				Grip 185 AE Right		Grip 185 AE Left		English Vocabulary	
	F	Hand	RS	%	RS	Grade	RS	Grade	VSS	%
1	GJ	R	39	40	166	B	156	C	200	75
2	IG	R	66	90	118	D	130	D	189	60
3	IG	R	15	15	97	B	83	D	194	65
4	IG	R	40	55	186	A	153	C	190	60
5	IG	R	25	25	171	B	157	C	100	5
6	GJ	R	45	60	133	D	147	C	150	15
7	GJ	R	14	10	65	D	56	D	150	15
8	GJ	R	39	40	73	D	51	D	171	35
9	GJ	R	67	90	126	D	122	D	194	65
10	GJ	R	27	20	69	D	66	D	184	50
11	GJ	R	74	95+	82	D	40	D	188	55
12	GJ	R	62	90	105.5	B	91.5	B	203	80
13	IG	R	19	20	111	A	82.5	C	206	80
14	IG	R	63	95	87	C	82	D	184	50
15	IG	R	54	75	120	A	100	A	177	50
16	IG		33	50	170	B	158	C	211	90
17	IG	R	42	75	71	D	62	D	202	75
18	IG	L	19	15	89	B	92	B	208	85
19	IG	R	31	35	85	D	83	D	165	25
20	IG	R	42	55	155	C	130	D	213	90
21	IG	R	39	60	125	A	111	A	216	95

Note: Separate male and female norms were used on the following worksamples:

Graphoria
Ideaphoria
Inductive Reasoning (Form LA)
Wiggly Block
Paper Folding
Silograms
Observation
Grip